Volumetric Residential Rates: Socially Regressive or Progressive

HARVARD ELECTRICITY POLICY GROUP

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Background

Misalignment of Rates and Costs...

<table>
<thead>
<tr>
<th>Variable</th>
<th>$60</th>
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<tbody>
<tr>
<td>Fixed</td>
<td>$10</td>
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<tr>
<td>Demand</td>
<td>$50</td>
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...has led to Rate Design Reform
(43 utilities in 21 states offer residential demand charges)

What is Rate Design Reform Impact on Low-Income Customers?
What is a progressive/regressive electricity rate?

**Inspiration from tax policy**
- **Progressive tax**: imposes a lower tax rate on lower income consumers compared to higher income consumers.
- **Regressive tax**: tax applied uniformly taking a larger percentage of income from low-income earners than from high income earners.

**Electricity Rates**
- A Progressive electricity rate, therefore, would have an effective rate (whether volumetric, demand or customer-related) that is lower for lower income customers and higher for higher income customers.
- **Not common** (Inclining block rates? Low-income assistance programs)

**Implications**
- Instead, the relevant exercise is what is the effect of rate design reform on low-income customers from a **consumer surplus perspective**?
- Acknowledging that an ideal three-part rate design tariff where prices are the same, irrespective of income is as regressive/progressive as a purely volumetric rate where the rate is the same for all customer income categories.
Can we estimate the impact on low-income customers ex-ante? (Yes, but...)

Key Parameters

- **Type of rate design reform**
  (TOU, type of demand charge, revenue neutrality)

- **Customer load characteristic**
  (average usage and peak consumption: “peaky vs. non-peak” customers)

- **Implementation**
  (targeted consumer outreach, low-income programs)

- **Demand Response**
  (how responsive to price changes for usage and demand)

Economic and consumer behavior theory cannot predict unambiguous impact on low-income consumers, need to examine effects of reform ex-post
## Literature on the impact of rate design reform

<table>
<thead>
<tr>
<th>Study</th>
<th>Impact on Low-Income Customer</th>
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<tbody>
<tr>
<td>Faruqui et. al, (2010) IEE WhitePaper (the Brattle Group)</td>
<td>“Our core finding is that low income customers are responsive to dynamic rates and that many such customers can benefit even without shifting load.”</td>
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<tr>
<td>“The Impact of <strong>Dynamic Pricing</strong> on Low Income Customers”</td>
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<td>Hledik and Greenstein (2016) <em>The Electricity Journal</em></td>
<td>“On average, demand charges did not affect the bills of low-income customers differently than they affected the bills of non-low-income customers”</td>
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<td>“The distributional impact of residential demand charges”</td>
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<tr>
<td>Cappers et. al. (2016) Lawrence Berkeley National Laboratory</td>
<td>“When taken together, low-income customers fared no better and no worse than other customers when it came to the bill impacts of CPP...”</td>
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<tr>
<td>“Experiences of Vulnerable Residential Customers Subpopulations with <strong>Critical Peak Pricing</strong>”</td>
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Illustrative results from a utility case study

Bill Impact analysis of several different types of demand charges, 9MKD is a 9-hour daily peak window

Overall, 53% of customers experience a bill decrease

Average bill change for low-income customer was -0.6% compared to 0.1% for non-low income customers

Bill savings are better for most low income customers...

...but a fraction experience larger bill increases than non-low income customers